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Epidemiologic Notes and Reports

Deaths Associated with Exposure to Fumigants in Railroad Cars — United States

Multiple incidents of illness and death following exposure to fumigated agricultural products in railroad cars have been reported by several states along the U.S.-Mexico border. From 1989 through 1993, the Texas Department of Health identified three incidents involving 11 exposed persons, resulting in two deaths. The California Environmental Protection Agency, Department of Pesticide Regulation, recorded two deaths in fumigated boxcars in 1989. This report summarizes the two most recent fatal incidents.

Case 1

On September 18, 1993, during routine inspection of a train 450 miles east of El Paso, Texas, U.S. Immigration and Naturalization Service Border Patrol agents discovered four males (aged 12, 35, 39, and 52 years) in a hopper car containing loose bulk lima beans. These persons entered the rail car in El Paso through an unlocked top hatchway at approximately 7 a.m. While in the rail car, the men opened the hatch door as fresh air was needed, then closed it. They fell asleep and were discovered by border patrol agents at 11 p.m.

When found, the three men were ill, and the 12-year-old was dead. The men reported nausea, vomiting, headache, and abdominal discomfort. The cause of death for the 12-year-old was listed as asphyxiation after inhalation of phosphine gas. No autopsy was conducted.

One man was available for follow-up interview; he reported that he did not see any signs on the rail car that warned of pesticide use. According to border patrol reports, warning signs on the rail car indicated the beans had received routine fumigation with aluminum phosphide.

Case 2

On March 29, 1989, the body of a 23-year-old man was discovered in a rice-filled rail car as it was unloaded in Maxwell, California. Autopsy results revealed phosphine in tissue samples. On March 17 in Houston, aluminum phosphide pellets had been deposited in the loaded railroad car. The rail car had been sealed with plastic and

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warning signs had been posted. Rips discovered in the plastic during unloading indicated that the car had been entered after fumigation.

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Editorial Note: Fumigant pesticides routinely are used to protect grains and legumes from insect damage during transport and storage. Before 1986, carbon tetrachloride and carbon disulfide mixtures were the primary fumigants used during rail transport. When these products were banned by the U.S. Environmental Protection Agency (EPA) (*1,2*), fumigation using phosphorus and sulfur compounds increased. Aluminum phosphide, which is highly insecticidal (*3*), has been used increasingly by the grain industry (*4*). Aluminum phosphide pellets, deposited into a loaded boxcar, react with moisture in the grain to create the toxic gas phosphine; the reaction can occur within 5 minutes (*2*). The U.S. Department of Transportation (DOT) requires that, after a loaded car is fumigated, it should remain out of transit for 48 hours. Once the gas completely dissipates, the food product is nontoxic (*5*).

Fumigants, such as aluminum phosphide, can liberate toxic gases that are rapidly absorbed through the respiratory tract (*6*). Symptoms may begin immediately and can include fatigue, headache, nausea, vomiting, abdominal pain, cough, and shortness of breath. Acute poisoning, such as occurs after inhalation of phosphine, can lead to pulmonary edema, central nervous system depression, toxic myocarditis, and circulatory collapse (*3*). Aluminum phosphide cannot be detected in blood or urine (*7*). Treatment is symptomatic and supportive. Long-term effects may include genotoxicity (*1*).

Both the DOT* and EPA (*8*) publish guidelines for placement of warning signs on transport vehicles or freight containers that have been fumigated or treated with poisonous substances. These guidelines vary regarding the size and placement of the sign and the wording, graphic symbols, and languages used on the sign. Carriers may conform to either agency's set of regulations and guidelines. DOT is reviewing its regulations for potential updating.

Surveillance for pesticide poisoning is complicated by lack of uniform reporting guidelines and difficulty in attributing specific adverse health outcomes to pesticide exposure. Although 25 states require that illnesses caused by pesticides be reported, few actively solicit and follow up case reports (*10*). The Texas case report was detected through the Sentinel Event Notification System for Occupational Risk (SENSOR) program of CDC's National Institute for Occupational Safety and Health (NIOSH)†. Texas mandates reporting of only occupationally related pesticide exposures; persons who apply fumigants, agricultural workers, and grain inspectors may be exposed to high levels of fumigants. Nonoccupational exposures, such as in this report, can be reported to the Texas Department of Health; nonoccupational exposures and fatalities (*9*) may occur during residential application by unlicensed

*CFR parts 172.201, 172.510, 173.9, and 49 CFR chapter 1 (10-1-92 Edition).

†SENSOR is a program of cooperative agreements between NIOSH and state health departments to develop generalizable models for state-based occupational health surveillance. Fourteen states have been awarded cooperative agreements to develop surveillance systems for 12 conditions.

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personnel or following improper disposal of fumigation pellets. California mandates that physicians report all illnesses caused by pesticides to local health officers.

Deaths resulting from illegal entry into fumigated rail transport cars have not been reported previously. The incidents described here underscore the potential for state-based surveillance systems to identify new problems that require corrective measures. Appropriately placed, highly visible warning signs printed in English and other languages that incorporate symbols may have prevented these deaths. Other prevention measures should include adequate locking for all points of entry on rail cars.

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Epidemiologic Notes and Reports

Legionnaires' Disease Associated with Cooling Towers — Massachusetts, Michigan, and Rhode Island, 1993

From July through October 1993, outbreaks of Legionnaires' disease (LD) were reported from communities in Massachusetts and Rhode Island and from a state prison in Michigan. Cooling towers (CTs) were identified as the source of all three outbreaks. This report summarizes investigations by state and local health officials and CDC and efforts to control these outbreaks.

Massachusetts

During July–August 1993, LD was diagnosed in 11 persons living in Fall River, Massachusetts. The mean age of patients was 59 years (range: 40–72 years); six were men. Three persons died. Three persons had *Legionella pneumophila* serogroup 1 (Lp-1) isolated from respiratory secretions, four had Lp-1 antigens detected in respira-

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tory secretions by direct fluorescent antibody testing, three had fourfold rises in serum antibody titer to Lp-1, and one had both a fourfold rise in serum antibody titer and Lp-1 antigens detected in urine by radio-immunoassay.

A case-control study, matching the 11 patients and 22 controls by primary physician, age, sex, and underlying medical condition, indicated that patients were more likely than controls to have visited sites within a 0.04-square-mile (0.1-square-km) neighborhood of Fall River in the 2 weeks before onset of illness (matched odds ratio [OR]=14.0; 95% confidence interval [CI]=1.6–120.8); no other activities were significantly associated with acquiring LD.

Water samples from seven CTs within the neighborhood and from the homes of culture-positive patients were taken approximately 1 month after onset of the last identified case of LD in the community and cultured for legionellae. All samples from potable water taps in patients' homes were culture-negative. Five isolates were cultured from four CTs. Lp-1 was cultured from two conjoined CTs on a building within the neighborhood and had the same monoclonal antibody subtype (MAS) and pulsed-field gel electrophoresis (PFGE) patterns as all three clinical isolates.

The conjoined CTs were decontaminated on an emergency basis according to guidelines previously developed by a technical work group (*1*). The onset of the last identified case was August 10, and the CT was decontaminated on September 24. No additional cases were identified after decontamination.

Michigan

During August–September 1993, LD was diagnosed in 17 persons with pneumonia at a state prison in Michigan; 16 patients were inmates, and one was an employee. One patient died. The mean age of the patients was 47 years (range: 29–81 years); all were men. One person had Lp-1 cultured from respiratory secretions and, for 11, LD was diagnosed by a fourfold rise in titer of antibodies to Lp-1; five patients with pneumonia had evidence of LD by single convalescent-phase antibody titers of 512 or more.

Water samples from wells and potable water taps in the prison and the prison hospital, from the prison hospital CT, and from a CT near the prison were cultured for legionellae. All of the potable water samples were culture-negative. Lp-1 was isolated from both CTs. The isolate from the CT located on the roof of the prison hospital had the same PFGE pattern as the single clinical isolate.

Fourteen (0.6%) of 2253 prisoners who used exercise yards each day adjacent (within 100 yards) to the prison hospital had LD, compared with two (0.1%) of the 2270 inmates who used yards at least 400 yards from the prison hospital (relative risk=7.1; 95% CI=1.6–31.0).

The CT on the prison hospital was shut down on September 17 and decontaminated according to published guidelines (*1*). No new cases of LD were identified with onset after September 1.

Rhode Island

During August 30–October 20, 1993, LD was diagnosed in 17 patients who lived or worked in eastern Rhode Island. The patients' mean age was 54 years (range: 28–86 years); 11 were men. Two patients died. Seven patients had Lp-1 cultured from respiratory secretions and 10 had Lp-1 antigen detected in urine.

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A case-control study, matching the 17 patients with 33 controls by physician practice, age, sex, and underlying medical conditions, indicated that patients were more likely than controls to visit a 0.04-square-mile (0.1-square-km) section of downtown Providence (matched OR=6.5; 95% CI=1.4–30.9) in the 2 weeks before onset of illness.

Water samples from the homes of six culture-positive patients were negative for legionellae by culture, but samples from 10 of 24 CTs and one of three decorative fountains in downtown Providence were positive for Lp-1. The environmental isolates were tested by MAS and PFGE; one isolate from a CT on a building located within the area had the same MAS and PFGE patterns as isolates cultured from four case-patients who reported visiting the LD-associated section of downtown Providence. No other sources of transmission were identified in the community. These Lp-1 isolates had MAS and PFGE patterns that were different than those from the Fall River outbreak (approximately 19 miles away); however, the PFGE patterns suggested that the isolates were genetically related.

The CT was shut down and decontaminated on an emergency basis on October 26. No additional cases of LD associated with the area were identified after decontamination of the CT.

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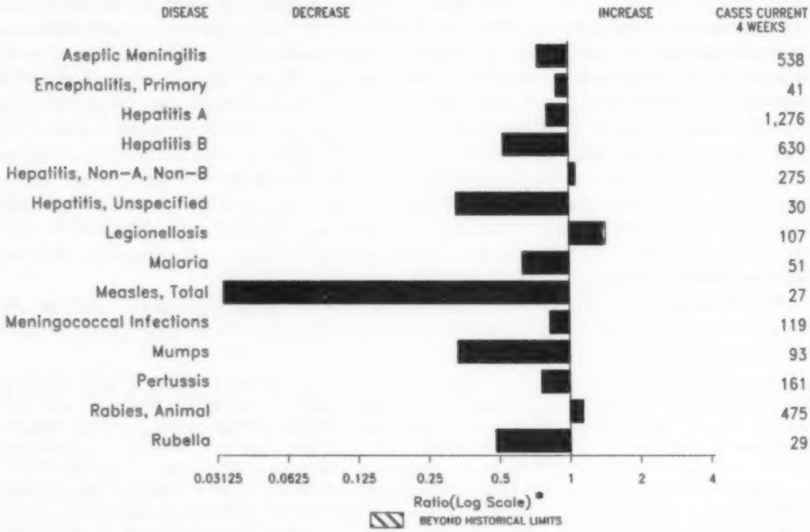
Editorial Note: Approximately 1000–1300 cases of LD are reported to CDC annually. However, because previous studies indicate that most cases are not diagnosed, the incidence of disease may be substantially higher (*2*). *Legionella* causes 1%–5% of community-acquired pneumonia in adults (*3*); most cases occur sporadically. The case-fatality rate of LD is 5%–30% (*2*).

Diagnosis of LD requires heightened clinical suspicion. Culturing respiratory secretions for legionellae and testing urine for presence of antigen are not routinely performed for patients with community-acquired pneumonia. Although not widely used, urinary antigen detection is a sensitive (60%–80%), highly specific (more than 99%), and rapid method for diagnosing infection caused by Lp-1 (the cause of 90% of cases of LD) (*4*). In comparison, serial serum antibody titers require several weeks for definitive results. Single serum antibody titer results have low predictive value (positive and negative) and are not useful for diagnosing LD in nonoutbreak situations. However, they may be useful in identifying cases during outbreaks of LD when serial serum specimens are unavailable—as for some patients in the Michigan investigation—and when *Legionella* is suspected to be the cause of a substantial proportion of pneumonia under investigation.

Although most cases of LD are not associated with outbreaks, investigations of outbreaks have provided most of the knowledge about transmission of the disease. LD can be transmitted by aerosol-producing devices (e.g., CTs [*5,6*], evaporative condensers [*7,8*], whirlpool spas [*2*], humidifiers [*9*], and decorative fountains [*2*]), and by potable water aerosolized by shower heads and tap-water faucets (*2,10*).

(Continued on page 499)

FIGURE I. Notifiable disease reports, comparison of 4-week totals ending July 9, 1994, with historical data — United States



*Ratio of current 4-week total to mean of 15 4-week totals (from previous, comparable, and subsequent 4-week periods for the past 5 years). The point where the hatched area begins is based on the mean and two standard deviations of these 4-week totals.

TABLE I. Summary — cases of specified notifiable diseases, United States, cumulative, week ending July 9, 1994 (27th Week)

	Cum. 1994		Cum. 1994
AIDS*	37,529	Measles: imported	139
Anthrax	-	indigenous	562
Botulism: Foodborne	35	Plague	7
Infant	34	Poliomyelitis, Paralytic§	-
Other	7	Psittacosis	20
Brucellosis	42	Rabies, human	-
Cholera	9	Syphilis, primary & secondary	11,091
Congenital rubella syndrome	3	Syphilis, congenital, age < 1 year	-
Diphtheria	-	Tetanus	18
Encephalitis, post-infectious	59	Toxic shock syndrome	110
Gonorrhea	188,741	Trichinosis	26
Haemophilus influenzae (invasive disease)†	626	Tuberculosis	10,713
Hansen Disease	55	Tularemia	27
Leptospirosis	15	Typhoid fever	185
Lyme Disease	2,606	Typhus fever, tickborne (RMSF)	151

*Updated monthly; last update June 28, 1994.
†Of 586 cases of known age, 164 (28%) were reported among children less than 5 years of age.
§No cases of suspected poliomyelitis have been reported in 1994; 3 cases of suspected poliomyelitis have been reported in 1993; 4 of the 5 suspected cases with onset in 1992 were confirmed; the confirmed cases were vaccine associated.

TABLE II. Cases of selected notifiable diseases, United States, weeks ending July 9, 1994, and July 10, 1993 (27th Week)

Reporting Area	AIDS*	Aseptic Meningitis	Encephalitis		Gonorrhea		Hepatitis (Viral), by type				Legionellosis	Lyme Disease
			Primary	Post-infectious			A	B	NA,NB	Unspecified		
	Cum. 1994	Cum. 1994	Cum. 1994	Cum. 1994	Cum. 1994	Cum. 1993	Cum. 1994	Cum. 1994	Cum. 1994	Cum. 1994	Cum. 1994	Cum. 1994
UNITED STATES	37,529	2,959	284	59	188,741	201,499	10,466	5,755	2,199	226	769	2,606
NEW ENGLAND	1,590	94	8	3	4,157	3,552	166	194	72	15	22	623
Maine	49	10	1	-	49	40	16	9	-	-	-	2
N.H.	32	8	-	2	47	27	8	18	6	-	-	9
Vt.	21	7	-	-	14	14	2	-	-	-	-	2
Mass.	812	33	5	-	1,514	1,460	71	142	54	14	16	94
R.I.	122	36	2	1	238	197	14	4	12	1	6	77
Conn.	554	-	-	-	2,295	1,814	55	21	-	-	-	439
MID. ATLANTIC	8,992	214	24	8	19,899	23,259	601	571	257	4	106	1,483
Upstate N.Y.	1,052	106	13	1	4,905	4,352	298	215	122	2	24	1,000
N.Y. City	4,639	20	1	-	6,289	7,376	79	45	-	-	-	3
N.J.	2,357	-	-	-	2,654	3,041	154	195	111	-	15	236
Pa.	944	88	10	7	6,051	8,490	70	116	24	2	67	244
E.N. CENTRAL	3,249	446	71	12	36,897	40,730	1,009	618	173	5	224	37
Ohio	580	107	19	1	11,765	10,267	371	96	13	-	102	23
Ind.	360	71	2	1	4,327	4,143	197	107	5	-	58	6
Ill.	1,602	85	25	3	8,877	14,497	215	114	33	2	10	3
Mich.	527	176	21	7	8,760	8,620	136	203	119	3	38	5
Wis.	180	7	4	-	3,167	3,203	90	98	3	-	16	-
W.N. CENTRAL	830	168	16	3	9,482	10,981	520	326	91	6	81	40
Minn.	213	15	2	-	1,621	1,179	109	39	10	1	-	8
Iowa	29	49	-	-	727	840	28	16	7	4	22	1
Mo.	363	60	5	2	5,238	6,440	221	238	60	1	41	20
N. Dak.	18	1	2	-	14	26	1	-	-	-	4	-
S. Dak.	9	-	2	-	96	151	17	-	-	-	-	-
Nebr.	48	6	3	1	-	484	76	17	4	-	12	8
Kans.	150	37	2	-	1,786	1,861	68	18	10	-	2	3
S. ATLANTIC	8,992	693	58	22	52,831	52,897	712	1,360	367	20	188	307
Del.	122	13	-	-	815	708	11	4	1	-	-	6
Md.	1,079	94	13	2	9,853	8,001	101	183	20	5	55	143
D.C.	763	18	-	1	3,632	2,627	10	20	-	-	5	2
Va.	656	92	14	5	6,507	6,061	74	62	18	2	5	33
W. Va.	23	9	1	-	364	293	6	18	20	-	1	9
N.C.	663	105	29	1	13,192	12,840	64	150	35	-	12	40
S.C.	612	17	-	-	6,399	5,246	25	22	3	-	9	5
Ga.	1,056	28	1	-	-	4,660	23	486	148	-	72	62
Fla.	4,018	317	-	13	12,069	12,461	396	405	122	13	29	7
E.S. CENTRAL	1,031	211	22	1	22,509	22,531	253	565	429	2	37	20
Ky.	161	69	9	1	2,324	2,335	96	47	13	-	5	10
Tenn.	315	34	9	-	6,972	7,097	92	480	408	1	20	7
Ala.	315	88	4	-	7,928	7,872	43	38	8	1	9	3
Miss.	240	20	-	-	5,285	5,227	22	-	-	-	3	-
W.S. CENTRAL	3,972	304	19	1	23,456	22,216	1,477	660	249	47	22	50
Ark.	134	19	-	-	3,530	3,158	31	13	4	1	5	3
La.	614	16	3	-	6,321	6,192	74	95	73	1	4	-
Okla.	156	-	-	-	1,969	2,428	127	163	139	1	9	24
Tex.	3,068	269	16	1	11,636	10,438	1,245	389	33	44	4	23
MOUNTAIN	1,242	89	5	3	4,259	5,786	2,028	284	214	28	48	5
Mont.	15	-	-	-	44	22	15	13	4	-	14	-
Idaho	30	3	-	-	42	107	167	49	48	1	1	1
Wyo.	12	2	-	2	38	44	14	13	74	-	3	1
Colo.	472	27	1	-	1,395	1,941	204	18	20	9	8	-
N. Mex.	92	6	-	-	499	482	596	111	35	7	1	3
Ariz.	349	30	-	-	1,480	2,161	683	21	8	8	2	-
Utah	69	8	-	1	149	71	218	31	16	-	5	-
Nev.	203	13	4	-	612	958	131	28	9	3	14	-
PACIFIC	7,631	740	61	6	15,251	19,547	3,700	1,187	347	99	41	41
Wash.	489	-	-	-	1,386	1,984	185	37	35	1	5	-
Oreg.	324	-	-	-	476	668	212	25	6	1	-	-
Calif.	6,697	655	60	5	12,573	16,373	3,146	1,095	301	95	33	41
Alaska	26	13	1	-	445	270	123	7	-	-	-	-
Hawaii	95	72	-	1	371	252	34	23	5	2	3	-
Guam	1	7	-	-	67	61	12	-	-	4	2	-
P.R.	1,012	20	-	3	272	256	36	176	81	3	-	-
V.I.	12	-	-	-	11	61	-	1	-	-	-	-
Amer. Samoa	-	-	-	-	18	22	4	-	-	-	-	-
C.N.M.I.	-	-	-	-	23	47	3	-	-	-	-	-

N: Not notifiable U: Unavailable C.N.M.I.: Commonwealth of Northern Mariana Islands

*Updated monthly; last update June 28, 1994.

TABLE II. (Cont'd.) Cases of selected notifiable diseases, United States, weeks ending July 9, 1994, and July 10, 1993 (27th Week)

Reporting Area	Malaria	Measles (Rubeola)					Menin-gococcal Infections	Mumps		Pertussis			Rubella		
		Indigenous		Imported*		Total									
	Cum. 1994	1994	Cum. 1994	1994	Cum. 1994	Cum. 1993	Cum. 1994	1994	Cum. 1994	1994	Cum. 1994	Cum. 1993	1994	Cum. 1994	Cum. 1993
UNITED STATES	446	4	562	1	139	208	1,555	17	763	20	1,536	1,861	7	193	131
NEW ENGLAND	32	-	12	-	10	57	77	-	14	-	161	362	-	122	1
Maine	2	-	1	-	3	-	13	-	3	-	2	6	-	-	1
N.H.	3	-	1	-	-	-	6	-	4	-	38	98	-	-	-
Vt.	1	-	1	-	1	31	2	-	-	-	27	44	-	-	-
Mass.	12	-	2	-	4	16	29	-	-	-	73	175	-	120	-
R.I.	5	-	4	-	2	1	-	-	1	-	4	4	-	1	-
Conn.	9	-	3	-	-	9	27	-	6	-	17	35	-	1	-
MID. ATLANTIC	61	2	152	-	18	13	145	4	66	1	310	334	-	9	45
Upstate N.Y.	23	-	25	-	3	1	54	-	17	-	122	83	-	8	11
N.Y. City	11	2	14	-	2	4	10	3	5	1	65	21	-	1	16
N.J.	17	-	109	-	11	8	36	-	6	-	8	40	-	-	9
Pa.	10	-	4	-	2	-	45	1	38	-	115	190	-	-	9
E.N. CENTRAL	48	-	54	-	40	15	237	2	131	3	227	382	1	11	2
Ohio	7	-	15	-	-	6	67	1	41	3	78	107	-	-	1
Ind.	11	-	-	-	1	-	42	-	6	-	37	29	-	-	-
Ill.	16	-	17	-	38	9	82	-	50	-	45	89	-	3	-
Mich.	12	-	19	-	1	-	28	1	30	-	22	18	1	8	-
Wis.	2	-	3	-	-	-	18	-	4	-	45	139	-	-	1
W.N. CENTRAL	24	-	116	-	42	3	113	-	37	1	79	106	-	-	1
Minn.	7	-	-	-	-	-	8	-	4	-	39	46	-	-	-
Iowa	4	-	6	-	1	-	13	-	10	-	6	1	-	-	-
Mo.	10	-	108	-	40	1	56	-	19	1	19	38	-	-	1
N. Dak.	1	-	-	-	-	-	1	-	2	-	3	3	-	-	-
S. Dak.	-	-	-	-	-	-	7	-	-	-	-	2	-	-	-
Nebr.	1	-	1	-	1	-	8	-	2	-	5	5	-	-	-
Kans.	1	-	1	-	-	2	20	-	-	-	7	11	-	-	-
S. ATLANTIC	97	-	7	-	2	22	270	2	116	2	174	153	-	9	6
Del.	3	-	-	-	-	-	2	-	-	-	-	3	-	-	-
Md.	47	-	1	-	1	4	22	1	35	-	56	51	-	-	2
D.C.	8	U	-	U	-	-	2	U	-	U	4	2	U	-	-
Va.	10	-	1	-	1	1	45	1	26	-	17	17	-	-	-
W. Va.	-	-	-	-	-	-	10	-	3	-	2	3	-	-	-
N.C.	2	-	-	-	-	-	41	-	26	-	44	25	-	-	-
S.C.	2	-	-	-	-	-	11	-	6	-	10	5	-	-	-
Ga.	11	-	2	-	-	-	52	-	7	-	13	12	-	-	-
Fla.	14	-	3	-	-	17	85	-	13	2	28	35	-	9	4
E.S. CENTRAL	12	-	28	-	-	1	104	-	15	1	86	79	-	-	-
Ky.	3	-	-	-	-	-	28	-	-	-	52	13	-	-	-
Tenn.	6	-	28	-	-	-	24	-	6	-	17	34	-	-	-
Ala.	2	-	-	-	-	1	46	-	3	1	14	26	-	-	-
Miss.	1	-	-	-	-	-	6	-	6	-	3	6	-	-	-
W.S. CENTRAL	21	-	9	1	7	1	194	2	170	1	53	36	5	12	12
Ark.	2	-	-	-	1	-	33	1	1	1	11	3	-	-	-
La.	4	-	-	-	1	1	23	-	18	-	6	6	-	-	1
Okla.	2	-	-	-	-	-	19	1	23	-	20	14	-	4	1
Tex.	13	-	9	1†	5	-	119	-	128	-	16	13	5	8	10
MOUNTAIN	18	-	139	-	12	2	104	1	47	3	113	135	-	4	6
Mont.	-	-	-	-	-	-	3	-	-	-	3	-	-	-	-
Idaho	2	-	-	-	-	-	15	-	5	-	23	18	-	1	1
Wyo.	1	-	-	-	-	-	5	-	1	-	-	1	-	-	-
Colo.	6	-	13	-	1	2	16	-	2	3	34	59	-	-	1
N. Mex.	3	-	-	-	-	-	11	N	N	-	9	21	-	-	-
Ariz.	1	-	-	-	-	-	38	-	24	-	33	20	-	-	1
Utah	4	-	126	-	-	-	11	-	7	-	9	16	-	2	2
Nev.	1	-	-	-	11	-	5	1	7	-	2	-	-	1	1
PACIFIC	133	2	45	-	8	94	311	6	167	8	333	274	1	26	58
Wash.	4	-	-	-	-	-	22	1	5	1	16	23	-	-	-
Oreg.	7	-	-	-	-	-	48	N	N	1	27	3	-	-	1
Calif.	112	1	44	-	6	78	234	5	151	5	282	242	1	23	34
Alaska	-	1	1	-	-	-	2	-	2	-	-	3	-	1	1
Hawaii	10	-	-	-	2	16	5	-	9	1	8	3	-	2	22
Guam	1	U	211	U	-	2	1	U	4	U	-	-	U	1	-
P.R.	2	-	13	-	-	292	6	-	2	-	1	1	-	-	-
V.I.	-	U	-	U	-	-	-	U	-	U	-	-	U	-	-
Amer. Samoa	-	U	-	U	-	1	-	U	1	U	1	2	U	-	-
C.N.M.I.	1	U	26	U	-	1	-	U	2	U	-	-	U	-	-

*For measles only, imported cases include both out-of-state and international importations.

N: Not notifiable U: Unavailable † International § Out-of-state

TABLE II. (Cont'd.) Cases of selected notifiable diseases, United States, weeks ending July 9, 1994, and July 10, 1993 (27th Week)

Reporting Area	Syphilis (Primary & Secondary)		Toxic-Shock Syndrome	Tuberculosis		Tula-remia	Typhoid Fever	Typhus Fever (Tick-borne) (RMSF)	Rabies, Animal
	Cum. 1994	Cum. 1993	Cum. 1994	Cum. 1994	Cum. 1993	Cum. 1994	Cum. 1994	Cum. 1994	Cum. 1994
UNITED STATES	11,091	13,974	110	10,713	11,025	27	185	151	3,129
NEW ENGLAND	118	190	2	216	239	-	13	8	953
Maine	4	3	-	-	5	-	-	-	-
N.H.	1	18	-	11	10	-	-	-	96
Vt.	-	1	1	3	3	-	-	-	83
Mass.	47	86	1	110	135	-	9	7	389
R.I.	9	6	-	18	34	-	1	-	5
Conn.	57	76	-	74	52	-	3	1	400
MID. ATLANTIC	648	1,352	18	1,895	2,284	1	49	-	328
Upstate N.Y.	69	116	8	112	336	1	6	-	79
N.Y. City	295	681	-	1,238	1,399	-	29	-	-
N.J.	104	202	-	380	205	-	14	-	153
Pa.	160	353	10	165	344	-	-	-	96
E.N. CENTRAL	1,446	2,377	23	1,070	1,161	2	33	21	20
Ohio	611	649	7	169	162	-	4	12	-
Ind.	122	200	2	88	117	-	2	2	4
Ill.	388	943	5	548	611	-	17	5	3
Mich.	162	333	9	230	222	1	3	2	7
Wis.	163	252	-	35	49	1	7	-	6
W.N. CENTRAL	605	906	17	272	240	13	-	12	106
Minn.	25	39	1	57	30	-	-	-	12
Iowa	29	42	7	20	27	-	-	1	47
Mo.	521	727	5	125	123	9	-	4	9
N. Dak.	-	2	-	4	5	-	-	-	5
S. Dak.	-	1	-	16	10	1	-	6	11
Nebr.	-	10	2	10	14	1	-	1	-
Kans.	30	85	2	40	31	2	-	-	22
S. ATLANTIC	3,236	3,604	6	2,067	2,181	-	27	71	1,088
Del.	13	71	-	-	21	-	1	-	21
Md.	119	197	-	162	195	-	5	6	313
D.C.	128	196	-	53	85	-	1	-	2
Va.	399	335	1	185	237	-	5	4	207
W. Va.	8	4	-	44	44	-	-	2	42
N.C.	916	1,009	1	245	267	-	-	26	91
S.C.	388	552	-	202	216	-	-	2	90
Ga.	806	611	-	464	394	-	1	28	197
Fla.	459	629	4	712	722	-	14	3	125
E.S. CENTRAL	1,935	1,956	2	662	786	-	2	11	96
Ky.	111	166	1	168	190	-	1	-	4
Tenn.	506	559	1	207	232	-	1	8	34
Ala.	363	441	-	213	244	-	-	1	58
Miss.	955	790	-	74	120	-	-	2	-
W.S. CENTRAL	2,532	2,675	1	1,384	1,049	7	9	19	365
Ark.	269	315	-	142	82	6	-	2	15
La.	931	1,266	-	14	12	-	4	-	43
Okla.	83	192	1	146	81	1	1	14	21
Tex.	1,249	902	-	1,082	874	-	4	3	286
MOUNTAIN	148	128	4	233	286	3	6	9	45
Mont.	3	1	-	9	5	1	-	4	-
Idaho	5	-	1	6	7	-	-	-	1
Wyo.	-	4	-	3	2	-	-	2	12
Colo.	73	38	1	1	42	-	2	2	-
N. Mex.	9	19	-	37	35	1	-	-	2
Ariz.	30	52	-	110	126	-	1	1	23
Utah	5	1	2	23	11	1	1	-	5
Nev.	23	13	-	44	58	-	2	-	2
PACIFIC	423	786	37	2,914	2,799	1	46	-	128
Wash.	32	28	-	151	132	-	3	-	-
Oreg.	20	30	-	81	57	1	-	-	-
Calif.	367	722	34	2,501	2,431	-	41	-	99
Alaska	3	4	-	33	34	-	-	-	29
Hawaii	1	2	3	148	145	-	2	-	-
Guam	4	2	-	18	39	-	1	-	-
P.R.	159	291	-	33	111	-	-	-	45
V.I.	22	27	-	-	2	-	-	-	-
Amer. Samoa	1	-	-	3	2	-	1	-	-
C.N.M.I.	1	3	-	22	19	-	1	-	-

U: Unavailable

TABLE III. Deaths in 121 U.S. cities,* week ending July 9, 1994 (27th Week)

Reporting Area	All Causes, By Age (Years)						P&I† Total
	All Ages	≥65	45-64	25-44	1-24	<1	
NEW ENGLAND	586	392	108	51	25	10	36
Boston, Mass.	162	93	36	19	8	6	18
Bridgeport, Conn.	53	36	8	6	2	1	1
Cambridge, Mass.	22	17	5	-	-	-	1
Fall River, Mass.	23	20	3	-	-	-	-
Hartford, Conn.	56	36	9	7	4	-	2
Lowell, Mass.	29	23	4	2	-	-	2
Lynn, Mass.	15	10	5	-	-	-	-
New Bedford, Mass.	18	13	3	2	-	-	1
New Haven, Conn.	34	24	5	3	1	1	-
Providence, R.I.	38	24	4	3	7	-	-
Somerville, Mass.	3	2	-	1	-	-	-
Springfield, Mass.	46	30	11	3	1	1	2
Waterbury, Conn.	18	12	5	-	1	-	-
Worcester, Mass.	69	52	10	5	1	1	9
MID. ATLANTIC	2,183	1,403	436	251	40	53	83
Albany, N.Y.	38	30	6	-	-	2	3
Allentown, Pa.	16	14	1	1	-	-	-
Buffalo, N.Y.	101	74	18	4	1	4	1
Camden, N.J.	37	22	6	4	2	3	1
Elizabeth, N.J.	18	10	5	2	-	1	-
Erie, Pa.§	46	30	11	1	3	1	2
Jersey City, N.J.	51	31	10	6	1	3	-
New York City, N.Y.	1,226	740	257	180	26	23	36
Newark, N.J.	42	22	7	11	1	1	1
Paterson, N.J.	19	8	4	4	1	2	-
Philadelphia, Pa.	200	131	45	18	1	5	15
Pittsburgh, Pa.§	72	47	14	7	3	1	2
Reading, Pa.	12	9	1	2	-	-	-
Rochester, N.Y.	127	102	19	3	1	2	13
Schenectady, N.Y.	16	11	4	1	-	-	1
Scranton, Pa.§	29	23	5	-	-	1	1
Syracuse, N.Y.	53	38	8	5	-	2	3
Trenton, N.J.	32	22	8	-	-	2	-
Utica, N.Y.	24	20	3	1	-	-	1
Yonkers, N.Y.	24	19	4	1	-	-	1
E.N. CENTRAL	2,009	1,203	390	235	119	62	121
Akron, Ohio	68	52	10	4	2	-	1
Canton, Ohio	26	22	4	-	-	-	6
Chicago, Ill.	520	205	115	106	78	16	41
Cincinnati, Ohio	147	96	24	15	6	6	8
Cleveland, Ohio	126	74	31	14	2	5	5
Columbus, Ohio	161	111	30	16	1	3	7
Dayton, Ohio	110	73	25	9	2	1	3
Detroit, Mich.	205	104	46	30	14	11	5
Evansville, Ind.	40	29	9	2	-	-	-
Fort Wayne, Ind.	41	33	3	4	1	-	-
Gary, Ind.	11	4	4	1	1	1	-
Grand Rapids, Mich.	52	41	8	2	1	-	8
Indianapolis, Ind.	125	82	23	11	2	7	9
Madison, Wis.	U	U	U	U	U	U	U
Milwaukee, Wis.	113	76	27	5	2	3	13
Peoria, Ill.	30	21	5	2	-	2	7
Rockford, Ill.	40	30	1	5	2	2	2
South Bend, Ind.	31	22	4	-	2	3	-
Toledo, Ohio	108	83	15	7	1	2	6
Youngstown, Ohio	55	45	6	2	2	-	-
W.N. CENTRAL	581	420	92	39	16	14	18
Des Moines, Iowa	65	47	9	3	2	4	5
Duluth, Minn.	21	17	3	1	-	-	-
Kansas City, Kans.	14	11	3	-	-	-	-
Kansas City, Mo.	111	87	13	6	4	1	2
Lincoln, Nebr.	23	18	2	1	2	-	2
Minneapolis, Minn.	102	75	18	7	2	-	2
Omaha, Nebr.	64	44	11	6	-	3	4
St. Louis, Mo.	98	67	18	8	4	1	1
St. Paul, Minn.	40	28	7	1	-	4	1
Wichita, Kans.	43	26	8	6	2	1	1
S. ATLANTIC	964	566	205	137	39	16	46
Atlanta, Ga.	110	66	18	24	2	-	2
Baltimore, Md.	201	114	46	31	9	1	12
Charlotte, N.C.	67	34	19	7	4	3	4
Jacksonville, Fla.	116	76	21	11	6	2	10
Miami, Fla.	99	46	25	20	6	2	-
Norfolk, Va.	29	18	5	4	2	-	3
Richmond, Va.	U	U	U	U	U	U	U
Savannah, Ga.	42	29	4	7	2	-	3
St. Petersburg, Fla.	41	26	13	2	-	-	2
Tampa, Fla.	119	77	28	6	2	5	7
Washington, D.C.	124	70	22	23	6	3	1
Wilmington, Del.	16	10	4	2	-	-	2
E.S. CENTRAL	624	391	137	56	21	19	30
Birmingham, Ala.	90	57	16	9	2	6	2
Chattanooga, Tenn.	41	30	8	2	1	-	3
Knoxville, Tenn.	56	37	14	4	1	-	9
Lexington, Ky.	57	37	10	6	2	2	-
Memphis, Tenn.	197	118	45	22	10	2	10
Mobile, Ala.	38	25	8	3	-	2	1
Montgomery, Ala.	47	30	12	2	2	1	-
Nashville, Tenn.	98	57	24	8	3	6	5
W.S. CENTRAL	1,166	673	261	144	51	35	55
Austin, Tex.	59	44	10	5	-	-	5
Baton Rouge, La.	30	23	2	4	1	-	-
Corpus Christi, Tex.	33	22	7	3	1	-	1
Dallas, Tex.	141	81	27	20	4	9	1
El Paso, Tex.	61	37	10	7	3	4	2
Ft. Worth, Tex.	77	54	11	4	5	3	5
Houston, Tex.	296	146	88	41	14	7	23
Little Rock, Ark.	56	29	12	7	4	4	3
New Orleans, La.	96	42	29	16	6	1	-
San Antonio, Tex.	174	112	33	21	6	2	12
Shreveport, La.	65	38	16	4	4	3	-
Tulsa, Okla.	78	45	16	12	3	2	3
MOUNTAIN	741	499	140	59	26	17	36
Albuquerque, N.M.	87	51	21	8	4	3	1
Colo. Springs, Colo.	41	32	7	1	1	-	4
Denver, Colo.	96	66	18	7	1	2	6
Las Vegas, Nev.	129	89	18	11	6	5	2
Ogden, Utah	19	13	3	2	1	-	1
Phoenix, Ariz.	123	69	31	12	7	4	9
Pueblo, Colo.	35	28	6	1	-	-	3
Salt Lake City, Utah	92	64	13	10	3	2	5
Tucson, Ariz.	119	85	23	7	3	1	5
PACIFIC	1,717	1,125	322	183	52	31	131
Berkeley, Calif.	13	9	2	1	-	1	2
Fresno, Calif.	80	48	16	10	2	4	10
Glendale, Calif.	23	18	2	1	1	-	1
Honolulu, Hawaii	70	50	10	9	1	-	6
Long Beach, Calif.	67	45	10	8	4	-	8
Los Angeles, Calif.	334	205	70	40	17	1	14
Pasadena, Calif.	12	8	1	2	1	-	1
Portland, Oreg.	103	76	19	6	1	1	5
Sacramento, Calif.	150	94	31	15	6	4	14
San Diego, Calif.	300	216	51	22	5	5	27
San Francisco, Calif.	121	71	27	20	2	1	6
San Jose, Calif.	158	98	32	16	5	7	17
Santa Cruz, Calif.	34	22	7	3	1	-	1
Seattle, Wash.	128	74	23	24	5	2	8
Spokane, Wash.	60	44	12	2	-	2	7
Tacoma, Wash.	64	47	9	4	1	3	4
TOTAL	10,571¶	6,672	2,091	1,165	389	257	556

*Mortality data in this table are voluntarily reported from 121 cities in the United States, most of which have populations of 100,000 or more. A death is reported by the place of its occurrence and by the week that the death certificate was filed. Fetal deaths are not included.

†Pneumonia and influenza.

§Because of changes in reporting methods in these 3 Pennsylvania cities, these numbers are partial counts for the current week. Complete counts will be available in 4 to 6 weeks.

¶Total includes unknown ages.

U: Unavailable.

Legionnaires' Disease — Continued

CTs and evaporative condensers have been identified as sources of transmission of LD since the late 1970s. Although legionellae can be cultured in up to 40% of CTs, these devices are rarely associated with outbreaks of LD (*1*). To reduce CT-related LD, CDC recommends maintenance of all CTs in accordance with published guidelines.

Although the attributable risk of CTs in sporadically occurring LD is unknown, the findings in this report indicate that CTs remain an important cause of outbreaks of LD. In each investigation, molecular typing of isolates confirmed the epidemiologic findings. CDC, in collaboration with other agencies, is establishing guidelines for prevention of LD, targeting CTs as well as other known sources of LD.

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International Notes

Progress Toward Global Eradication of Poliomyelitis, 1988–1993

In May 1988, the World Health Organization (WHO) adopted a resolution to eradicate poliomyelitis by the year 2000. Since then, all six WHO regions have made substantial progress toward this goal using three major control strategies: 1) maintaining high coverage of children with at least three doses of oral poliovirus vaccine (OPV3); 2) administering supplementary doses of OPV to all young children (generally those aged <5 years) during National Immunization Days (NIDs)* and during door-to-door vaccination campaigns in areas where wild poliovirus circulation persists at

*Mass campaigns over a short period (days to weeks) in which two doses of OPV are administered to all children in the target age group, regardless of prior vaccination history, with an interval of 4–6 weeks between doses.

Poliomyelitis — Continued

low levels; and 3) developing sensitive systems of epidemiologic and laboratory surveillance (*1*). This report summarizes progress of the global polio eradication initiative from 1988 through 1993.†

Worldwide. Reported global vaccination coverage with OPV3 by age 1 year increased from 67% in 1988 to 85% in 1990 but decreased to 80% in 1992 and 81% in 1993 (Figure 1). From 1988 through 1993, reported cases of polio decreased 70%, from 32,286 to 9714 (Figure 1). During these years, there were substantial decreases in the number of countries reporting polio cases (88 [45%] of 196 and 56 [27%] of 209, respectively) and the number of countries reporting 100 or more cases per year (20 [10%] and 11 [5%], respectively) (Figure 2). In addition, the number of countries reporting zero polio cases increased from 107 (55%) to 144 (69%).§

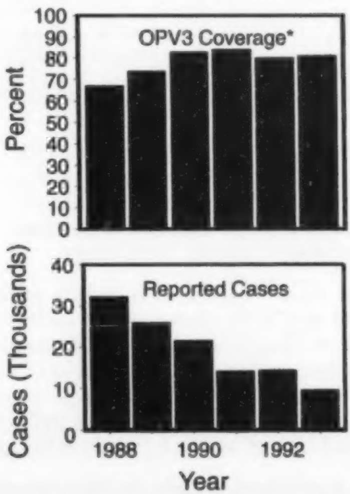
African Region. Reported coverage with OPV3 increased from 44% in 1988 to 57% in 1991 but decreased to 49% in 1992 and 50% in 1993. From 1988 through 1993, reported cases of polio decreased from 4546 to 1437. The number of countries reporting polio cases remained unchanged (37 [79%] of 47). In 1993, the African region reported 15% of the global total of polio cases. Despite reporting zero polio cases for more than 3 years, Namibia reported an outbreak of 53 cases in 1993, probably as a result of recent importation of wild poliovirus from a polio-endemic area.

Region of the Americas. Reported coverage with OPV3 increased from 82% to 86%, while reported cases of polio decreased from 340 to zero; the number of countries

†Based on surveillance data submitted to WHO as of July 1, 1994.

§The difference between the number of countries reporting polio cases or zero cases and the total number of countries reflects those not submitting reports.

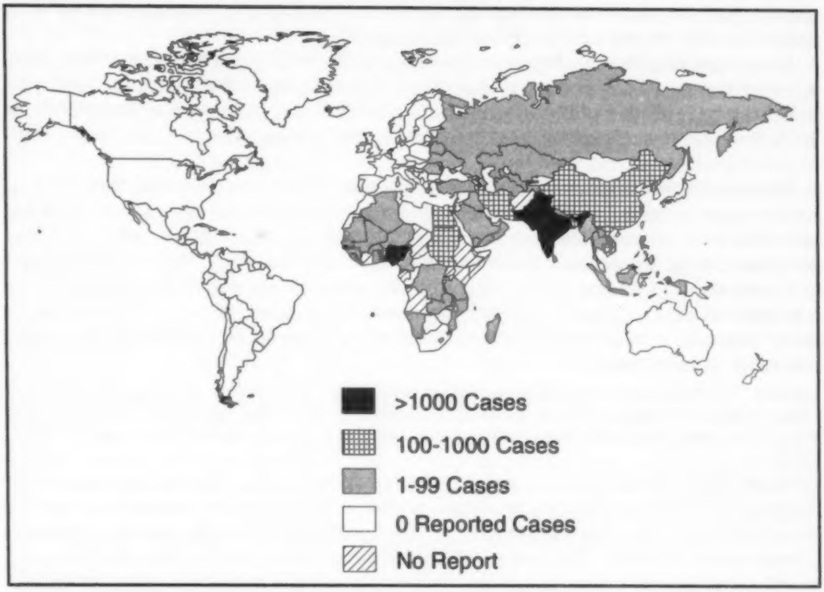
FIGURE 1. Reported coverage with three doses of oral poliovirus vaccine (OPV3) and poliomyelitis cases, by year — worldwide, 1988–1993



*Percentage of children who have received OPV3 by age 1 year.

Poliomyelitis — Continued

FIGURE 2. Incidence of poliomyelitis — worldwide, 1993



reporting polio cases decreased from 13 (28%) to zero of 47. The last confirmed case of paralytic polio caused by wild poliovirus occurred in August 1991 in Peru.

Eastern Mediterranean Region. Reported coverage with OPV3 increased from 69% to 75%, while reported cases of polio increased from 2332 to 2451; the number of countries in the region reporting polio decreased from 17 (71%) of 24 to 10 (43%) of 23. In 1993, the Eastern Mediterranean Region reported 25% of the global total of polio cases; 84% of the regional total was reported from Pakistan (74%) and Sudan (10%). In 1993, Pakistan and Sudan experienced large outbreaks (1803 and 252 reported cases, respectively), primarily among unvaccinated children. Despite OPV3 coverage of more than 85% and no reported cases for at least 2 years, small outbreaks of type 1 also occurred in Oman during 1988 and 1993 and in Jordan during 1991–92; all three outbreaks were caused by importation of wild poliovirus from other polio-endemic countries.

European Region. Reported coverage with OPV3 decreased from 86% to 72%, while reported cases of polio decreased from 206 to 198; the number of countries reporting polio cases increased from seven (23%) of 31 to 12 (24%) of 50. In 1993, the European Region reported 2% of the global total of polio cases; 83% of the regional total was from republics of the former Soviet Union. Azerbaijan and Uzbekistan experienced outbreaks in 1993 (70 and 68 reported cases, respectively), primarily among unvaccinated children. Despite coverage of 97% with three doses of inactivated poliovirus vaccine and no reported polio cases for more than 10 years, the Netherlands

Poliomyelitis — Continued

experienced an outbreak of 71 cases during 1992–93 among members of a religious group who do not routinely accept vaccination, caused by importation of wild poliovirus that originated from the Indian subcontinent.

Southeast Asia Region. Reported coverage with OPV3 increased from 57% to 90%, while reported cases of polio decreased from 22,814 to 4414. The number of countries in the region reporting polio cases decreased from nine (82%) to seven (64%) of 11. In 1993, the Southeast Asian Region reported 45% of the global total of polio cases; 93% of the regional total was from India.

Western Pacific Region. Reported coverage with OPV3 increased from 89% to 93%, while reported cases of polio decreased from 2079 to 1214; the number of countries reporting polio cases decreased from six (17%) to five (14%) of 35. In 1993, the Western Pacific Region reported 13% of the global total of polio cases; 88% of the regional total was from the People's Republic of China (54%) and Vietnam (34%). Despite OPV3 coverage of 90% and no reported polio cases for 5 years, Malaysia experienced a small outbreak in 1992 caused by importation of wild poliovirus that originated from the Indian subcontinent.

Reported by: Expanded Program on Immunization, Global Program for Vaccines, World Health Organization. Polio Eradication Activity, National Immunization Program; Div of Viral and Rickettsial Diseases, National Center for Infectious Diseases; International Health Program Office, CDC.

Editorial Note: Since 1988, the global incidence of paralytic polio has decreased substantially, and polio apparently has been completely eliminated from the Region of the Americas (*1,2*). The number of polio cases reported in 1993 represents a 33% decrease compared with 1992 and a 70% decrease compared with 1988. Furthermore, nearly three quarters of all countries reported zero cases of polio in 1993, and polio-free zones are present or emerging in the Americas, northern, southern, and eastern Africa, the Arabian peninsula, western and central Europe, and the Western Pacific (Figure 2).

Despite this substantial progress overall, paralytic polio remains highly endemic throughout the Indian subcontinent and continues to occur in most countries of sub-Saharan Africa and Asia, including many republics of the former Soviet Union (Figure 2). In 1993, nearly two thirds of all polio cases reported worldwide were from the Indian subcontinent, including 42% from India, 19% from Pakistan, and 2% from Bangladesh. Lower than optimal levels of routine vaccination coverage, pockets of unvaccinated children within otherwise highly vaccinated populations, crowding, poor sanitation, and suboptimal seroconversion to poliovirus types 1 and 3 following three routine doses of OPV in many tropical and subtropical regions probably contribute to ongoing wild poliovirus transmission in these areas (*1,3*).

In addition to remaining areas of endemic transmission, outbreaks of paralytic polio have recently occurred in several countries 2 or more years after the last reported case of polio, despite high levels of routine vaccination coverage (*4,5*). Genotypic comparisons between wild poliovirus strains in the global laboratory network have demonstrated that outbreaks in Oman (1988–89 and 1993), Jordan (1991–92), Malaysia (1992), and the Netherlands (1992–93) occurred as a result of importation of wild poliovirus from polio-endemic countries in the Indian subcontinent (*4,5*). Thus, until polio is eradicated globally, every polio-free country may be at risk for importation of wild poliovirus from remaining polio-endemic reservoirs.

Poliomyelitis — Continued

Routine vaccination alone is probably insufficient to eliminate wild poliovirus transmission in most countries, and supplementary vaccination activities, including NIDs, are necessary in countries where polio remains endemic (*1,2,6–10*). In 1993 and early 1994, NIDs were conducted for the first time in China, Vietnam, Philippines, Laos, Iran, and Pakistan, which together accounted for 31% of all polio cases reported globally; by the end of 1994, at least 63 (30%) of 209 countries will be conducting NIDs as a polio-control strategy. As more countries adopt this strategy, further progress is expected toward global eradication of polio.

Despite substantial progress toward global eradication of polio, several challenges remain, including 1) reversing the decline in global routine vaccination levels; 2) increasing vaccination levels in unvaccinated subpopulations; 3) preventing the reintroduction of wild poliovirus into polio-free areas by eliminating reservoirs in polio-endemic countries (particularly the Indian subcontinent); 4) increasing the awareness of donor agencies and governments in industrialized countries of the substantial financial and humanitarian benefits of global eradication of polio, thus engendering support from unaffected countries beyond that already provided by organizations such as Rotary International; 5) encouraging all countries that remain polio-endemic to make polio eradication a priority activity, including the implementation of NIDs and the initiation of acute flaccid paralysis surveillance; and 6) providing support to vaccination program managers for training to develop managerial skills for implementing and maintaining effective vaccination and surveillance programs in all countries. The success of the polio eradication initiative will depend on finding solutions to these financial, managerial, political, and technical challenges.

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Erratum: Vol. 43, No. 25

In Table III, "Deaths in 121 U.S. cities, week ending June 25, 1994 (25th Week)," the data are incorrect. The data given were for the 24th week. Data for week 25 are available from CDC's Systems Operations and Information Branch, Division of Surveillance and Epidemiology, Epidemiology Program Office, telephone (404) 639-3761.

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